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13. ABSTRACT *(Maximum 200 Words)*

The overall purpose of this study is to determine the relationship between skeletal and oral bone density, identify factors influencing bone loss, and determine the relationship between osteoporosis and oral bone loss, periodontal disease and tooth loss. We hypothesize that reduction in bone density leading to osteoporosis, plays a significant role in increasing susceptibility to destructive periodontitis and tooth loss. Sensitive and accurate measures of skeletal and oral bone mineral density, periodontal disease and tooth loss will be used. A wide variety of other risk factors for both osteopenia and periodontal disease will be assessed. A total of 1463 subjects were recruited from an ongoing NIH funded study cohort, the Women's Health Initiative (WHI) and are participants of this study. In this year findings were presented at the Congress of Epidemiology (June 2001, Toronto Canada) and at the International Association for Dental Research Meeting (June 2001, Chiba Japan). Data were presented for the first 608 study participants enrolled from the larger study of over 1400 women. Data analysis is ongoing. Copies of published abstracts and descriptive analysis of the 1463 enrolled is presented in this report.

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INTRODUCTION

The overall purpose of this study was to determine the relationship between skeletal and oral bone density, identify factors influencing bone loss, and determine the relationship between osteoporosis and oral bone loss, periodontal disease and tooth loss. We hypothesized that reduction in bone density leading to osteoporosis, plays a significant role in increasing susceptibility to destructive periodontal disease and tooth loss. Sensitive and accurate measures of skeletal and oral bone mineral density, periodontal disease and tooth loss were used in this study. A wide variety of other risk factors for both osteopenia and periodontal disease were assessed as part of this study. A total of 1463 subjects were recruited from an ongoing NIH funded study cohort, the Women's Health Initiative (WHI), making this an efficient and cost effective study. A limited number of studies have assessed bone loss in the oral cavity and have suggested that low bone density is associated with severe periodontal disease. However, these studies have been plagued with small sample sizes and poor assessments of confounding factors such as smoking, alcohol intake, and age, among others. Our study will assess these factors in detail. In this past year, findings were presented at the Congress of Epidemiology (June 2001, Toronto Canada) and at the International Association for Dental Research Meeting (June 2001, Chiba Japan). Data were presented for the first 608 study participants enrolled from the larger study of 1463 women. These presentations focused on the factors influencing the association between alveolar crestal height and bone density at various skeletal sites. In the previous year (2000) preliminary findings were presented at the World Congress of Osteoporosis (June, 2000; Chicago - See Appendix for copies of the abstracts). These analyses found that lower skeletal bone mineral density (BMD) is related to poorer alveolar crest height. In addition, in a second analysis we found moderate alcohol intake to be associated with higher BMD.

The U.S. population is projected to include an increasing proportion of older men and women in the next few decades, including retired and active military personnel. Hence, management of two of the most common chronic diseases in older persons, osteoporosis and periodontal disease, will demand increasing health service resources. New approaches to prevention, early diagnosis and intervention of these diseases are critical. This study has great practical significance. If oral bone loss is a predictor of low skeletal bone, those people detected on a dental exam to have oral

bone loss could be targeted for further evaluation for osteoporosis. Interventions could be started to prevent further bone loss or fracture. Conversely, those with weak skeletal bones may need evaluation for oral bone loss, preventing further loss of bone and subsequent tooth loss. This study potentially provides a new approach to screening for osteoporosis. Last, treatments affective for osteoporosis may prove useful in the prevention and treatment of oral bone and tooth loss.

BODY

This is an ongoing epidemiologic study entitled "Risk Factors for Osteoporosis and Oral Bone Loss in Postmenopausal Women". Data collection has been completed in this final year. Data clean-up has been ongoing and is continuing. The final analytic dataset is in place, although as analysis proceeds, additional data cleanup may be necessary (i.e. logic checks). Data analysis and preparation of publications is now our focus. The body of this report will highlight the methods, assumptions and procedures used for data collection, provide detail on data collection through 09/15/01 and provide specific information regarding tasks proposed in the outline of work.

Experimental Methods, Assumptions and Procedures:

Population to be studied. Subjects for the dental examination and dual-energy x-ray absorptiometry (DXA) were recruited from the participants in the Women's Health Initiative. The Women's Health Initiative (WHI) is a major research effort to study methods of disease prevention and health promotion among postmenopausal women. It includes a Clinical Trial and Observational Study (OS). Only women enrolled in the OS will be recruited to join this study. The WHI Observational Study (OS) includes postmenopausal women aged 50-79 years at baseline who were unwilling to participate or ineligible for the CT. As part of WHI the women have many baseline measurements, with clinical outcomes determined at annual intervals. The objectives of the OS are to obtain better estimates of the predictive ability of known risk factors for disease, to unearth new risk factors and biomarkers for disease, and to examine the relationship of change in characteristics to prevalent and future disease. In Buffalo, a total of 2248 women have enrolled into the WHI OS. Women agreeing to participate in the

Observational Study will be followed for an average of 9 years by the WHI staff. Baseline data collected as part of the OS will be related to putative risk factors and protective factors.

The current study, "Risk Factors for Osteoporosis and Oral Bone Loss", added a bone density scan and an oral examination to the Buffalo WHI OS protocol. In addition, this study was able to assess the prevalence and severity of osteopenia in this cohort of women, and evaluate osteopenia's role in development of periodontal disease/oral bone loss, and assess risk variables common or unique to each disease.

Subject recruitment. Subjects were recruited from the WHI Observational Study participants. Women who are enrolled in the WHI Observational Study were contacted by mail and given information about the Osteoporosis/Oral Bone Loss study and asked to participate. A recruitment tool is the offer of a free bone density assessment and dental/oral health examination. Each woman who expressed interest in the study is initially given a brief telephone eligibility screen. Those determined eligible were appointed for a clinical examination.

Of the 2,248 women enrolled in the WHI OS, 1463 were eligible, interested and participated in this study. Recruitment into this study was extremely successful. Our proposal had a goal of recruiting 1300 participants – *we exceeded that goal by 168 participants!* Details of subject recruitment as of 09/15/01 are presented in "Results and Discussion" section of this report.

Mailing. Women who entered the WHI OS study were contacted by mail and asked to call our center if they were interested in learning more about participating. When they called, these women were told about the osteo/dental study, given an opportunity to ask questions, and those who were interested were given a brief eligibility screen.

Eligibility Screen. Information collected on the eligibility screen concern criteria for both DXA and dental assessments. DXA scan exclusion criteria include recent use of contrast agents and known aortic calcification, steroid dependency (use of systemic steroids for the past 6 months), and active cancer or cancer chemotherapy. Criteria for the Periodontal exam are that subjects have at least 6 teeth and have had no periodontal surgery in the last 3 months. Age (50 to 79) and

postmenopausal status have already been met as part of WHI. All eligible women were informed that they would be required to sign an informed consent prior to DXA and dental examinations. If women were determined to be both eligible and interested, they were scheduled for an appointment and sent a study packet by mail. The study packet included information on temporary exclusion criteria to be aware of (i.e. contrast agents), study questionnaires to be completed at home and brought to the study visit, the consent form to read and review, instructions on what to wear and bring with them, information on premedication (if necessary), and a parking pass for the visit.

Examinations and Testing. At the time of the appointment, a DXA scan was performed by a trained and certified x-ray technician. All subjects accepted into the study received a measurement of bone mineral density by DXA. The DXA sites included the lumbar spine, femur and forearm, as well as a determination of whole body composition (fat, lean, mineral content). As part of the oral examination, all subjects received a complete head and neck and intraoral examination with assessment of periodontal disease by both probing depth and assessment of alveolar crestal height. In addition, mandibular bone density was assessed using a step wedge radiographic technique.

Before examination began, participants were required to sign an informed consent form that was reviewed with the participant by a member of the staff. Questions were answered on risks, benefits, voluntary participation and confidentiality.

Questionnaires were self-administered and brought to the visit. At the time of the visit the questionnaires were reviewed by study personnel for completeness and accuracy. Participants could request assistance in completing the questionnaires if needed. Additional information (not collected as part of WHI) on osteoporosis risk factors, oral health history, current medication intake and personal habit history were included in the questionnaires.

The **DXA exam** includes: AP/Lateral Assessment of the Lumbar Spine Density (L1, L2, L3 and L4); Femur Density Assessment (femoral neck, Ward's Triangle, trochanteric region,

inter-trochanteric region, and total region); Forearm; and Body Composition Assessment (total body skeletal density, fat and lean).

The **Oral Health Examination** included examination of the head and neck, and oral mucous membranes. Record of restorative appliances, as well as coronal and root caries, and missing teeth were done. Measurements included: plaque assessment, gingival assessment, calculus index, pocket depth measurement, and clinical attachment level (Florida probe). Oral radiographs included periapical x-rays for alveolar crestal height (ACH), and mandibular basal bone mineral density (MBMD). Radiographs were taken using a standardized techniques and measured using a computer-assisted technique using a method, training and calibration procedure developed by Dr. Hausmann and successfully applied locally. Samples of saliva, plaque and blood were collected and frozen.

Results and Discussion:

Analysis of study data and a report of final descriptive results follow. However, three interim analyses were conducted on 608 subjects. Results of these analyses were presented at the World Congress of Osteoporosis (June, 2000), the Congress of Epidemiology (June 2001, Toronto Canada) and at the International Association for Dental Research Meeting (June 2001, Chiba Japan). Outlined below is a detailed report of our recruitment experience as of the end of this project (09/01). Detail on recruitment is presented below.

Recruitment Summary as of 09/15/01

Recruitment for the ongoing cross-sectional study of Osteoporosis and Oral Bone Loss in Post-menopausal Women has been completed and was extremely successful. Our cross-sectional study proposed to enroll 1300 participants of 2,248 women enrolled in the Buffalo WHI OS. We exceeded our goal by 163 subjects, enrolling 1463 participants. Response rate is described below.

1463	(65%)	Enrolled in the Cross-sectional Study (Overall, 65% participation rate)
248	(11%)	Ineligible
115	(5%)	Unable to contact
370	(16%)	Refused or unable to schedule before enrollment ended (temp inelig.)
52	(2%)	Deceased

Periodontal disease patterns, prevalence, and severity were being determined by measuring CAL and radiographic ACH, two correlated but separately measured outcomes used to assess periodontal destruction. In addition, tooth loss and the reason for tooth loss was recorded. Risk indicators for periodontal disease have been collected among the following sets of systemic factors including BMD, age, race, education, physical activity, medical/dental history, reproductive history, medication use, body mass, nutritional factors with emphasis on dietary calcium, and personal habits such as smoking and alcohol use. In addition, local factors (dental care; current oral health) have been assessed. BMD has been assessed at spine, hip, forearm, mandible and whole body. ***Descriptive analyses for the 1463 participants in the cross-sectional study are presented below.***

Characteristics of the Cross-Sectional Study Participants

Study Variable		Value
Age (mean + SD)		66.8 ± 7.0
	<60	278 (19.0)
	60-<70	666 (45.5)
	70+	519 (35.5)
BMI (wt/ht^2)		26.7 ± 5.2
Race	White	1423 (97.4)
	African-American	23 (1.6)
	Hispanic	4 (0.27)
	American Indian / Alaskan Native	7 (0.48)
	Asian /Pacific Islander	4 (0.27)
Dietary Calcium (mg)		780 ± 434
Taking any Calcium supplement (current)		952 (65.1)
Dietary Vitamin D (mcg)		5.02 ± 3.19
Dietary Vitamin D (IU)		201 ± 127
Taking any Vitamin D supplement (current)		764 (52.2)
Education	High school	332 (22.7)
	College	634 (43.3)
	Graduate school	497 (34.0)
Osteoporosis	All sites normal T-scores	219 (15.0)
	All sites with low bone density	433 (29.6)
	1$^+$ sites with a T-score of -2.0 or less	811 (55.4)

Total Femur BMD (g/cm^2)		0.8589 ± 0.1375
Total Femur*	Normal	867 (59.3)
	Osteopenia	435 (29.7)
	Osteoporosis	161 (11.0)
Neck if Femur (g/cm^2)		0.7207 ± 0.1235
Neck of Femur	Normal	567 (38.8)
	Osteopenia	568 (38.8)
	Osteoporosis	328 (22.4)
Wrist BMD (g/cm^2)		0.5106 ± 0.0730
Wrist*	Normal	750 (51.3)
	Osteopenia	326 (22.3)
	Osteoporosis	387 (26.5)
Whole body BMD (g/cm^2)		1.0542 ± 0.1126
Whole Body*	Normal	921 (63.0)
	Osteopenia	336 (23.0)
	Osteoporosis	202 (13.9)
AP Spine BMD (g/cm^2)		0.9490 ± 0.1612
AP Spine*	Normal	715 (48.9)
	Osteopenia	395 (27.4)
	Osteoporosis	332 (23.0)
Lateral Spine BMD (g/cm^2)		0.6714 ± 0.1086
Lateral Spine*	Normal	338 (23.1)
	Osteopenia	406 (30.5)
	Osteoporosis	588 (44.1)
MBMD (mg/mm^2)		
1^{st} Molar Crestal (19 or 30)		5.076 ± 2.256
1^{st} Molar Subcrestal (19 or 30)		6.084 ± 2.598
2^{nd} Bicuspid Crestal (20 or 29)		4.508 ± 2.298
2^{nd} Bicuspid Subcrestal (20 or 29)		4.958 ± 2.496
Crestal (overall)		4.733 ± 2.139
Subcrestal (overall)		5.463 ± 2.362
HRT use		
Current HRT use		662 (45.3)
Former HRT use		306 (20.9)
Never HRT use		495 (33.8)
Fosamax (current)		90 (6.2)
Miacalcin (current)		25 (1.7)
Evista (current)		28 (1.9)
Fracture after 40		487 (33.3)

Smoking	Never	763 (52.2)
	Former	653 (44.7)
	Current	46 (3.2)
History Osteoporosis (known at baseline)		201 (13.8)
Parathyroid disease		11 (0.8)
Thyroid disease (any)		305 (20.9)
Diabetes		72 (4.9)
Family History of Osteoporosis – any blood relative		484 (33.1)
Family History of Osteoporosis – 1st degree relative		333 (22.8)
Menopause Age (years)		48.0 ± 5.4
Years in menopause (mean)		18.8 ± 8.5
Years in menopause, not using HRT (mean)		13.4 ± 10.1
Number of teeth present (mean)		23.2 ± 5.4
Loss of ACH, mean (mm) of all sites measured		2.47 ± 0.78
Mean Number of Sites with > 4mm of ACH loss		2.76 ± 4.2
	0 sites with > 4mm ACH loss	584 (40.3)
	1-4 sites with > 4mm ACH loss	564 (39.0)
	5+ sites with > 4mm ACH loss	299 (20.7)
Periodontal Pocket Depth (PPD, mean mm per mouth)		1.93 ± 0.35
Clinical Attachment Loss (CAL, mean mm per mouth)		2.28 ± 0.68

*NOF criteria for Normal, Osteopenia, Osteoporosis

Recommendations In Relation To The Outline Of Work:

The Timeline/Statement of Work from our proposal/funding application is presented below. For each of the tasks, a description of what has been completed and the relation to the timeline are described. In general, tasks have initiated and/or completed within the proposed time frame. When the time frame differs, an explanation is provided.

Proposed Timeline From Application:

Task 1: **Months 1-3[+]:** Hire personnel, complete training and certification (Nurse mgr, DXA tech, Dental Fellow, clerk, data mgr.)

We have hired, trained and certified a number of staff and key personnel. The personnel who have been employed either on the grant or as *in kind* contributions to the grant during the life of the grant are:

Staff Name	Position
Jean Wactawski-Wende, PhD	Principal Investigator
Robert Genco, DDS PhD	Co-Investigator
Sara Grossi, DDS MS	Co-Investigator
Ernest Hausmann, DMD PhD	Co-Investigator
Maurizio Trevisan, MD MS	Co-Investigator
Juan Loza, DDS PhD	Co-Investigator
Cheryl Klemenz	Project Manager/Data Manager
Laurie Barrick	DXA Technician
Dorothy Wright	Secretary/Data Clerk
Sharon Chory	Data Entry
June Markello	Dental Hygienist/Assistant
Mine Tezal, DDS MS	Dentist/Examiner
Marcelo Araujo, DDS	Dentist/Examiner
Michael Lynch, DMD	Dentist/Examiner
Jeffrey Rogers, DDS	Dentist/Examiner
Jim Katancik, DDS, PhD	Dentist/Examiner
Linda Roth	Dental Hygienist/Assistant
Patricia Gill	Dental Hygienist/Assistant
Jan Benedek	Dental Hygienist/Assistant
Steve Lancaster	Dental Hygienist/Assistant
Robert Dunford, MS	Dental Data Manager
Kathleen Hovey, MS	Data Analyst
Jolie Weiss, MS	Doctoral Student
Renee Brennan, BA	Master Student
Jennifer Reschke, BA	Master Student
Walter Iwanenko, MS	Doctoral Student

All staff have been trained to conduct their respective duties and certified. All investigators are actively involved in the project activities and meet regularly to discuss all aspects of the study. Investigators include Drs. Wactawski-Wende, Genco, Grossi, Hausmann, and Trevisan.

Task 2: **Months 1-3:** Identify OS participants from WHI database
Link study files to WHI OS participant files

The roster of all Observational Study participants from the WHI was extracted and a participant database was created for this study. This database has been used for all study mailings and contacts. It is updated periodically from the WHI roster to insure accuracy of address and other contact information. A separate data file has been completed to enter all clinical and questionnaire information we collect during the study. The data files are separate from the files which include patient identifiers for confidentiality reasons, linked by an study identification number.

Task 3: **Months 2-4:** Finalize study questionnaire; pilot test questionnaire

The questionnaires have been completed and approved for use by both our local IRB and the Army IRB. The questionnaires are completed by all participants. The information included on these questionnaires are supplemental to that already collected as part of WHI.

Task 4: **Months 4-6:** Preparation of initial sample mailing and contact to test contact procedures

Conduct pilot testing of examination procedures on sample of OS participants

Create computerized data files for entry of questionnaires and non-computerized clinical data

As reported in the first annual report, sample mailings were conducted in 80 subjects. This process was very useful in determining timing of appointments and logistics for conducting the study. It was also useful for training and certification of staff. The data entry files have been created and data entry is ongoing. The contact letter, screening questionnaires and consent were approved by the Army Human Use and University at Buffalo IRB.

Task 5: **Months 6-7**: Evaluate and revise procedures based on pilot sample

Procedures were evaluated and some revisions of the original grant were requested and received which have been implemented (i.e. blood, saliva and plaque collection; forearm scan). Procedures were set in year 2 and continued to be implemented through the end of the study data collection.

Task 6: **Months 7-40:** Begin weekly mailings to approximately 70 women

Weekly were sent and all 2249 WHI OS participants were contacted by mail. Details of the results of mailings are presented in "Results and Discussion".

Task 7: **Months 8-40:** Conduct eligibility screens on interested participants

Obtain informed consent

Conduct DXA/Dental evaluations and have participants complete study questionnaires

Continue quality control procedures throughout study to ensure quality of examiners

In an ongoing fashion completed eligibility screen, scheduled appointments for those interested and eligible, obtained informed consent, conducted both the DXA and dental examinations, collected questionnaire information, and continued quality control of all examining staff. As of 09/15/01 a total of 1463 women participated in the study.

Task 8: **Months 9-42:** Entry of questionnaire data and verification

Data management of computerized files

Entry and verification of the study data has been ongoing and is now cmplete. The computerized files for data entry have been created and are in use. The data from both the DXA scan and Dental exam were directly entered at time of visit and have been merged with questionnaire and WHI data. Back up copies of all data files are kept daily. Intensive data checking and verification has been the main activity of the last few months. A final cleaned data set with all enrollees information is now available. Additional edits of the data set will continue as data logic problems are identified during data analysis.

Task 9: **Months 40-48:** Begin preliminary data analysis; conduct multivariate analysis

Begin manuscript preparation

Inform participants of initial findings of the study

Preliminary analyses have been conducted on a subset of the cohort (see Appendix) and on the entire cohort (see body above). Analysis of the data, preparation of manuscripts and presentation of the results continues to be the focus of the our investigative team.

Research Accomplishments:

- Successful enrollment of 1463 study subjects (exceeded recruitment goal of 1300)
- Presentation of preliminary results (n=4) at a national/international meetings

Reportable Outcomes:

- Training and participation of dentist-scientists in research design, methods and implementation. The following have participated:

Mine Tezal, DDS MS
Marcelo Araujo, DDS
Michael Lynch, DMD
Jeffrey Rogers, DDS
Jim Katancik, DDS, PhD

Drs. Tezal and Araujo will continue training in the coming year.

- Drs. Tezal and Araujo enrolled in the PhD program in Epidemiology and Community Health.
- A PhD project ongoing for Walter Iwanenco, Doctoral student in Epidemiology and Community Health using a portion of this data.
- Hands-on training for graduate students in study implementation including:
    - Renee Brennan
    - Jolie Weiss
    - Jennifer Rescke
    - Cheryl Klemenz

- Funding has been applied for to the NIH for the study entitled "Bone Mineral Density as a Predictor of Periodontitis". This longitudinal study is planned to follow women enrolled in this study.
- A repository of blood, saliva and plaque has been established. The samples were collected as part of this study. Samples are stored in liquid nitrogen awaiting analysis.
- To date, 4 abstracts have resulted from this grant.

CONCLUSIONS

Results from this research will continue to be presented in the coming years. The importance and implications of this study are many. The proposed study has great practical significance since if oral bone loss is a predictor of skeletal bone loss, those women who are detected on dental exam to have oral bone loss could be targeted to have further evaluation of skeletal bone density to determine their risk of osteoporosis. These women could then be targeted for interventions which could prevent progression and/or future fracture. Conversely, women with severe skeletal osteopenia may need to be evaluated for risk of oral bone loss, in order to target interventions to prevent progression and subsequent tooth loss. This study potentially provides a new approach for screening for women at risk for osteoporosis.

APPENDIX

Published Abstracts/Poster Presentations:

AVERAGE TOTAL ALCOHOL INTAKE AND BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN
J. Wactawski-Wende, M. Trevisan, R. Brennan, S.G. Grossi, R.J. Genco, C. Klemenz
University at Buffalo, Buffalo, NY, USA
World Congress of Osteoporosis, Chicago, IL. June 15, 2000.

THE RELATIOSHIP OF BONE MINERAL DENSITY TO ORAL BONE LOSS IN POSTMENOPAUSAL WOMEN
J. Wactawski-Wende, S.G. Grossi, E. Hausmann, R. Dunford, R.J. Genco, C. Klemenz, M. Trevisan, University at Buffalo, Buffalo, NY, USA
World Congress of Osteoporosis, Chicago, IL. June 15, 2000.

ALVEOLAR CRESTAL RESORPTION AND BONE DENSITY IN POSTMENOPAUSAL WOMEN. J. Wactawski-Wende, E. Hausmann, M. Trevisan, K. Hovey, S.G. Grossi, R. Genco, University at Buffalo, Buffalo, NY, USA
World Congress of Epidemiology, Toronto, Canada. June 2001.

ALVEOLAR CRESTAL RESORPTION AND BONE DENSITY IN POSTMENOPAUSAL WOMEN. J. Wactawski-Wende, M. Trevisan, E. Hausmann, K. Hovey, S. Grossi, R.J. Genco, University at Buffalo, Buffalo, NY, USA
International Association for Dental Research, Chiba, Japan. June 2001.

CALL FOR ABSTRACTS

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World Congress on Osteoporosis 2000,
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and the International Osteoporosis Foundation
June 14, Pre-Congress
June 15-18, Chicago (Navy Pier), Illinois

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- ☐ Disclosure of presenter/ presentation's commercial support or relationship or possible conflict of interest. Attach a seperate statement specifying the nature of relationship with commercial supporter or financial support of the investigation.

Circle only one Category that suits the abstract. (Note: National Osteoporosis Foundation Abstract Review Committee's decisions prevail.)

1. Basic Cell Biology
2. Biochemical Markers
3. Bone Mass Density
4. Bone Mass Diagnosis
5. Osteoporosis - Diagnosis
6. Osteoporosis - Epidemiology
7. Osteoporosis - Genetics
8. Osteoporosis - Pathophysiology
9. Osteoporosis - Treatment

Provide Key Words:
bone mineral density
alcohol, menopause, women

Please review the information on the reverse of this page before submitting an abstract.

AVERAGE TOTAL LIFETIME ALCOHOL INTAKE AND BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN

J. Wactawski-Wende, M. Trevisan, R. Brennan, S.G. Grossi, R.J. Genco, C. Klemenz
University at Buffalo, Buffalo, NY, USA

This study assesses the relationship between average total lifetime alcohol intake and bone mineral density (BMD) in 608 Caucasian post-menopausal women from Buffalo, NY participating in a larger study of the relationship between BMD and periodontal disease, an ancillary study of the NIH Women's Health Initiative. After consent, all women completed questionnaires on health history and risk exposure, and had a physical exam. BMD of the hip (total femur region) was assessed by dual energy X-ray absorptiometry (DXA; Hologic QDR-4500). BMD was dichotomized for logistic regression analyses (lowest tertile vs. highest 2 tertiles). Alcohol intake (mean daily ounces total alcohol) was the primary independent variable of interest. Other factors assessed in the analysis were: age at interview, cigarette smoking (ever), education (≤high school, college, graduate school), body mass index (BMI), diabetes (ever), thyroid disease (ever), physical activity (daily hours standing), fracture ≥ age 40 (ever), and years of estrogen deficiency (years since menopause-years of estrogen replacement therapy). Alcohol intake was found to be significantly associated with *higher* BMD (OR=1.84, p=.0486). Other factors found to be related independently with *higher* BMD included: no history of adult fracture (OR=2.23, p=.0003), higher BMI (OR=1.18, p=.0000), younger age (OR=1.08, p=.0001), and fewer years without estrogen (OR=1.03, p=.0086). This study supports the hypothesis that moderate lifetime alcohol intake is associated with higher BMD of the total femur, even after controlling for factors known or suspected to be associated with bone mineral density.

CALL FOR ABSTRACTS

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Circle only one Category that suits the abstract. (Note: National Osteoporosis Foundation Abstract Review Committee's decisions prevail.)

1. Basic Cell Biology
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Provide Key Words:

bone mineral density, oral bone loss, alveolar crestal height, menopause, women

Please review the information on the reverse of this page before submitting an abstract.

THE RELATIOSHIP OF BONE MINERAL DENSITY TO ORAL BONE LOSS IN POSTMENOPAUSAL WOMEN

J. Wactawski-Wende, S.G. Grossi, E. Hausmann, R. Dunford, R.J. Genco, C. Klemenz, M. Trevisan, University at Buffalo, Buffalo, NY, USA

This study assesses the relationship between bone mineral density (BMD) and oral bone loss in 608 Caucasian postmenopausal women from Buffalo, NY participating in a study of BMD and periodontal disease, an ancillary study of the NIH Women's Health Initiative. After consent, women completed questionnaires on health history, risk exposures and had a physical exam. Oral bone loss was defined as mean loss of alveolar crestal height (ACH) dichotomized for logistic regression analyses (worst ACH tertile vs. best tertiles). BMD of the total femur (lowest vs. highest 2 tertiles) was the primary independent variable of interest and was assessed by dual energy X-ray absorptiometry (DXA; Hologic QDR-4500). Other factors assessed included: age at visit, cigarette smoking (ever), education (≤ high school, college, graduate school), body mass index (BMI), diabetes (ever) and years estrogen deficiency (years since menopause - years on estrogen). Lower ACH was significantly associated with lower BMD (OR=1.81, p=.0134). Other factors independently associated with lower ACH included: older age (OR=1.11, p=.0000) and ever smoking cigarettes (OR=1.84, p=.0033). This study supports the hypothesis that lower BMD is associated with loss of oral bone even after controlling for factors known or suspected to be associated with either ACH or BMD. This study is one of the largest to date and supports previous findings by us and others that lower BMD is related to oral bone loss, that may lead to tooth loss. Additional research is needed to better understand this relationship.

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ALVEOLAR CRESTAL BONE RESORPTION AND BONE DENSITY IN POSTMENOPAUSAL WOMEN.

J Wactawski-Wende*, M Trevisan, E Hausmann, K Hovey, S Grossi and R Genco (University at BUffalo, Buffalo, NY 14214)

The study objective was to assess the relationship between a measure of alveolar bone resorption, alveolar crestal height (ACH), and bone mineral density (BMD) in 560 white postmenopausal women from Buffalo, NY participating in a study of the role of osteoporosis in periodontal disease, an ancillary study of the NIH Women's Health Initiative Observational Study. After consent, women completed questionnaires and had both a physical and oral examination. ACH was defined as the average distance between the cemento-enamel junction and the alveolar crest in millimeters measured in two sites per tooth for all teeth present. BMD was measured at the spine, femur, wrist and whole body by dual energy X-ray absorptiometry (Hologic). In logistic regression analyses, participants in the lowest quartile of the BMD distribution exhibited significantly higher alveolar bone resorption: wrist (OR=5.3), total femur (OR=2.5), femoral neck (OR=3.2), whole body (OR=3.3) and lateral spine (OR=4.4), after adjusting for smoking, body mass index, education and diabetes. However, these associations lost statistical significance after adjustment for either age or years after menopause without hormone use: wrist (OR=1.4), total femur (OR=0.9), femoral neck (OR=1.4), whole body (OR=1.0) and lateral spine (OR=1.7). This study provides evidence that in postmenopausal women, age and years after menopause may play an important role in determining the observed association between BMD and ACH. Prospective studies are needed to better understand this relationship.
Supported by NIH # NO1WH32122; USARMC #DAMD17-96-1-6319.

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Alveolar Crestal Bone Resorption and Bone Density in Postmenopausal Women.

J. WACTAWSKI-WENDE*, E. HAUSMANN, M. TREVISAN, K. HOVEY, S.G. GROSSI, R.J. GENCO (University at Buffalo, Buffalo, NY).

The study objective was to assess the relationship between a measure of alveolar bone resorption, alveolar crestal height (ACH), and bone mineral density (BMD) in 560 white postmenopausal women from Buffalo, NY participating in a study of the role of osteoporosis in periodontal disease, an ancillary study of the NIH Women's Health Initiative Observational Study. After consent, women completed questionnaires and had both a physical and oral examination. ACH was defined as the average distance between the cemento-enamel junction and the alveolar crest in millimeters measured in two sites per tooth for all teeth present. BMD was measured at the spine, femur, wrist and whole body by dual energy X-ray absorptiometry (Hologic). In logistic regression analyses, participants in the lowest quartile of the BMD distribution exhibited significantly higher alveolar bone resorption: wrist (OR=5.3), total femur (OR=2.5), femoral neck (OR=3.2), whole body (OR=3.3) and lateral spine (OR=4.4), after adjusting for smoking, body mass index, education and diabetes. However, these associations lost statistical significance after adjustment for either age or years after menopause without hormone use: wrist (OR=1.4), total femur (OR=0.9), femoral neck (OR=1.4), whole body (OR=1.0) and lateral spine (OR=1.7). This study provides evidence that in postmenopausal women, age and years after menopause may play an important role in determining the observed association between BMD and ACH. Prospective studies are needed to better understand this relationship.
Supported by NIH # NO1WH32122; USARMC #DAMD17-96-1-6319. jww@buffalo.edu

P#

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